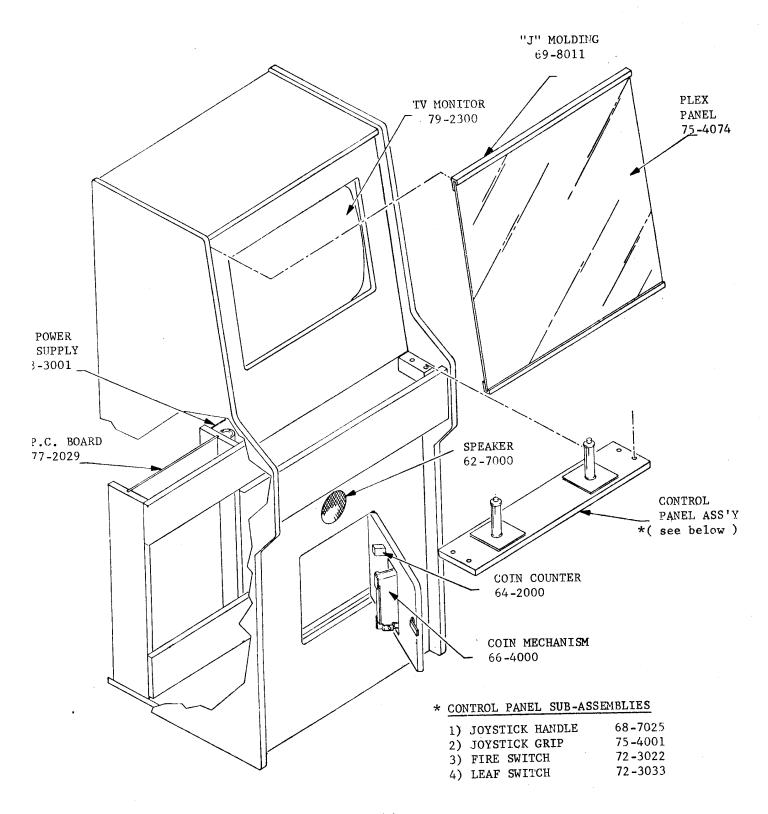
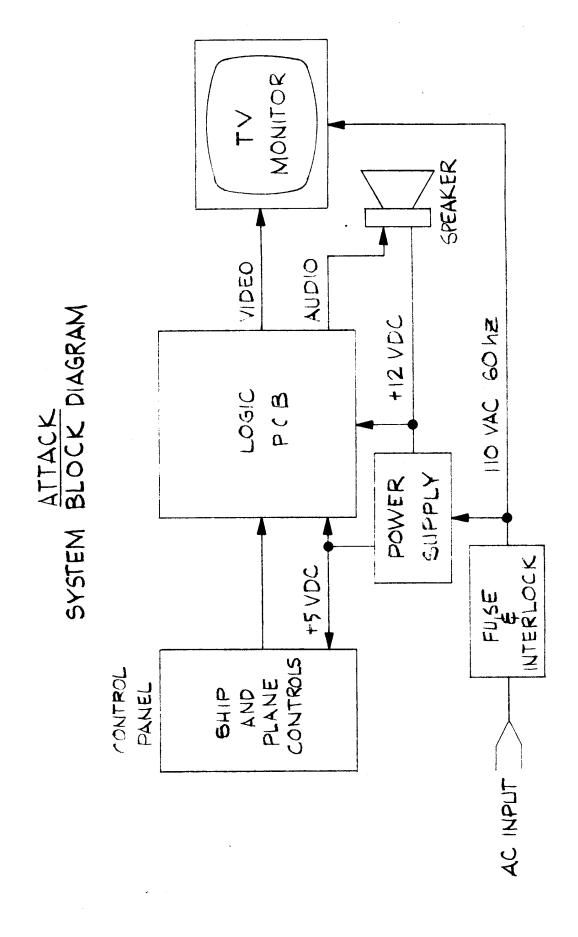
BY Exidy

**SERVICE MANUAL** 

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P.C. Board Logic Diagram Back of	Manua1





#### I. Adjustments

#### A. Power Supply Adjustment

Proper operation of this game is absolutely dependent on proper adjustment of the +5vdc power supply.

Before attempting to operate or troubleshoot this game, measure and adjust, as necessary, the +5vdc power supply voltage.

Measure voltage with meter leads contacting +5vdc and ground traces on P.C.B., near the 6 pin connector.

The power supply voltage is set at the factory, but shocks due to shipping and handling may cause this setting to vary.

#### B. Volume Adjustment

Sound volume is adjustable using the pot on the P.C.B. nearest the 22 pin connector.

#### C. Game Time Adjustment

Game time (length of game) is adjustable using the pot on the P.C.B. nearest the 6 pin connector.

## Troubleshooting Tips

Rothing happens	SYMPTOM	POSSIBLE CAUSE	SOLUTION
Bad TV Monitor   Repair or replace   Bad power supply   Repair or replace   Bad P.C.B.   Repair or replace   Check output of power supply for +5vdc. If not present, replace   Repair or replace   Check power supply harness. Wire attached to cap should have +12vdc.   Repair or replace   Repair or replace   Check mover supply harness. Wire attached to cap should have +12vdc.   Repair or replace   Check microswitch and mechanism.   Repair or replace   Check microswitch and mechanism.   Repair or replace		Blown fuse	Replace
Bad TV Monitor   Repair or replace   Bad P.C.B.   Repair or replace   Rad TV Monitor   Repair or replace	Nothing happens	Interlock switch not closing	check switch alignment
Game has sound but no picture  Bad TV Monitor  No +5vdc  Repair or replace  Check output of power supply for +5vdc. If not present, replace power supply.  Bad P.C.B.  Bad P.C.B.  Repair or replace  Check output of power supply for +5vdc. If not present, replace power supply.  Repair or replace  Check power supply harness. Wire attached to cap should have +12vdc.  Bad speaker  Game does not start with coin  All controls completely inoperative  Some controls inoperative  Some controls  Game is erratic.  Seems to work OK sometimes, other times not.  Bad P.C.B.  Bad P.C.B.  Bad P.C.B.  Bad leaf switches in control panel  Control panel  Carpet  Weather  Seems to work OK sometimes, other times not.  Bad P.C.B.  Bad P.C.B.  Bad P.C.B.  Bad P.C.B.  Bad P.C.B.  Carpet  Weather  No +12vdc  Check power supply harrens. Wire attached to cap should have +12vdc.  Repair or replace  Solder 12" long 22 awg. insulated wire to pin connector). Leave one end hanging loose, taking care that wire is properly insulated. If game		Bad TV Monitor	Repair or replace
Game has sound but no picture  Bad TV Monitor  No +5vdc  Repair or replace  Check output of power supply for +5vdc. If not present, replace power supply.  Bad P.C.B.  Repair or replace power supply.  Repair or replace  Check power supply harness. Wire attached to cap should have +12vdc.  Bad speaker  Came does not start with coin  All controls completely inoperative  Some controls inoperative  Some controls  Some controls  Some controls  Some is erratic.  Seems to work OK sometimes, other times not.  Bad P.C.B.  Count wire to control disconnected)  Bad leaf switches in control panel bent). Once bent, switch is unreliable.  Adjust power supply.  Measure voltage with test leads on P.C.B. (near 6 pin connector).  Bad P.C.B.  Bad P.C.B.  Bad P.C.B.  Carpet  Weather  Nearby devices generating high voltages and/or high frequencies.  Nearby devices generating care that wire is properly insulated. If game	Game blows fuses	Bad power supply	Repair or replace
Game has sound but no picture    Bad TV Monitor   Repair or replace	Game has sound but		Repair or replace
No +5vdc  No +5vdc  No +5vdc  Check output of power supply for +5vdc. If not present, replace power supply.  Bad P.C.B.  Came has picture but no sound  Bad P.C.B.  Came does not start with coin  All controls completely inoperative  Came controls inoperative  Came is erratic. Seems to work OK sometimes, other times not.  Came is static sensitive  Came is static sensitive  No +5vdc  No +5vdc  Bad P.C.B.  Bad P.C.B.  Bad P.C.B.  Bad P.C.B.  Bad P.C.B.  Bad P.C.B.  Carpet  Carpet  Nearby devices generating high voltages and/or high frequencies.  Came is picture power supply harness. Wire attached to cap should have +12vdc.  Replace  Check power supply harness. Wire attached to cap should have +12vdc.  Replace  Check microswitch and mechanism.  Repair or replace  Adjust power supply.  Measure voltage with test leads on P.C.B. (near 6 pin connector).  Repair or replace  Solder 12" long 22 awg. insulated wire to pin connector). Leave one end hanging loose, taking care that wire is properly insulated. If game			Repair or replace
Same has picture but no sound  Bad P.C.B.  Bad speaker  Bad P.C.B.  Bad speaker  Bad P.C.B.  Some controls inoperative  Bad P.C.B.  Bad leaf switches in control panel in sound in sunreliable.  Game is erratic.  Seems to work OK sometimes, other times not.  Bad P.C.B.  Bad P.C.B.  Bad leaf switches in control panel is unreliable.  Carpet  Bad P.C.B.  Bad P.C.B.  Bad leaf switches in control panel is unreliable.  Adjust power supply.  Measure voltage with test leads on P.C.B. (near 6 pin connector).  Bad P.C.B.  Bepair or replace  Bad P.C.B.  Bepair or replace  Solder 12" long 22 awg.  insulated wire to pin connector). Leave one end hanging loose, taking care that wire is properently insulated. If game		No +5vdc	Check output of power
Game has picture but no sound  Bad P.C.B.  Bad speaker  Bad P.C.B.  Bad speaker  Bad P.C.B.  Bad speaker  Bad P.C.B.  Bad P.C.B.  Bad coin mechanism  All controls completely inoperative  Bad P.C.B.  Some controls inoperative  Bad leaf switches in control panel  Game is erratic.  Seems to work OK sometimes, other times not.  Bad P.C.B.  Bad P.C.B.  Bad leaf switches in control panel  Bad P.C.B.  Bad leaf switches in control panel  Bad P.C.B.  Bad leaf switches in leads on P.C.B. (near 6 pin connector).  Bad P.C.B.  Bad P.C.B.  Bad P.C.B.  Bad leaf switches in control panel  Bad P.C.B.  Bad leaf switches in leads on P.C.B. (near 6 pin connector).  Bad P.C.B.			supply for +5vdc. If
Game has picture but no sound  Bad P.C.B.  No +12vdc  Check power supply harness. Wire attached to cap should have +12vdc.  Bad speaker  Bad P.C.B.  Bad P.C.B.  Some does not start with coin  All controls completely inoperative  Bad P.C.B.  Some controls inoperative  Game is erratic.  Seems to work OK sometimes, other times not.  Bad P.C.B.  Carpet  Carpet  Game is static Sensitive  Bad P.C.B.  Bad P.C.B.  Bad P.C.B.  Bad P.C.B.  Bad P.C.B.  Bad P.C.B.  Carpet  Weather  Nearby devices generating high voltages and/or high frequencies.  Repair or replace  Solder 12" long 22 awg. insulated wire to pin  20 of J2 (P.C.B. 22 pin connector). Leave one end hanging loose, taking care that wire is prop- erly insulated. If game			not present, replace
Game has picture but no sound  Bad P.C.B.  No +12vdc  Check power supply harness. Wire attached to cap should have +12vdc.  Bad speaker  Bad P.C.B.  Bad P.C.B.  Some does not start with coin  All controls completely inoperative  Bad P.C.B.  Some controls inoperative  Game is erratic.  Seems to work OK sometimes, other times not.  Bad P.C.B.  Carpet  Carpet  Game is static Sensitive  Bad P.C.B.  Bad P.C.B.  Bad P.C.B.  Bad P.C.B.  Bad P.C.B.  Bad P.C.B.  Carpet  Weather  Nearby devices generating high voltages and/or high frequencies.  Repair or replace  Solder 12" long 22 awg. insulated wire to pin  20 of J2 (P.C.B. 22 pin connector). Leave one end hanging loose, taking care that wire is prop- erly insulated. If game			power supply.
Game has picture but no sound  Bad speaker  Bad P.C.B.  Came is erratic.  Seems to work OK sometimes, other times not.  Bad P.C.B.  Carpet  Bad P.C.B.  Bad P.C.B.  Repair or replace  Repair  Repair  Repair  Repair  Repair  Repair  Repair  Bad P.C.B.  Repair  Beal P.C.B.  Beal P.C.B.  Repair  Beal P.C.B.  Repair  Beal P.C.B.  Beal P.C.B.  Repair  Beal P.C.B.  Beal P.C.B.  Repair  Be	-	Bad P.C.B.	
Bad speaker  Game does not start with coin  All controls completely inoperative  Some controls inoperative  Game is erratic. Seems to work OK sometimes, other times not.  Bad P.C.B.  Bad leaf switches in control panel bent). Once bent, switch is unreliable.  Adjust power supply.  Measure voltage with test leads on P.C.B. (near 6 pin connector).  Bad P.C.B.  Carpet  Game is static sensitive  Nearby devices generating high voltages and/or high frequencies.  Bad speaker  Repair or replace  Repair or replace  Repair or replace  Repair or replace  Solder 12" long 22 awg. insulated wire to pin connector). Leave one end hanging loose, taking care that wire is properly insulated. If game			
Game does not start with coin  All controls completely inoperative  Some controls inoperative  Game is erratic. Seems to work OK sometimes, other times not.  Bad P.C.B.  Bad leaf switches in control panel bent). Once bent, switch is unreliable.  Adjust power supply.  Measure voltage with test leads on P.C.B. (near 6 pin connector).  Bad P.C.B.  Carpet  Solder 12" long 22 awg.  insulated wire to pin 20 of J2 (P.C.B. 22 pin connector). Leave one high frequencies.  Bad P.C.B. end hanging loose, taking care that wire is properly insulated. If game			
Game does not start with coin  Bad P.C.B.  Bad coin mechanism  Check microswitch and mechanism.  Check microswitch and mechanism.  Repair or replace  Check microswitch and mechanism.  Repair or replace  Repair or replace  Repair  Repair or replace  Repair  Repair or replace  Repair  Repair or replace  Repair  Repair or replace  Repair  Repair or replace  Solder 1, manufactor).  Repair or replace  Solder 12" long 22 awg.  insulated wire to pin  Nearby devices generating  high voltages and/or  high frequencies.  Repair or replace  Solder 12" long 22 awg.  insulated wire to pin  20 of J2 (P.C.B. 22 pin  connector). Leave one  end hanging loose, taking  care that wire is prop-  erly insulated. If game		·	cap should have +12vdc.
Game does not start with coin  Bad P.C.B.  Bad coin mechanism  Check microswitch and mechanism.  Check microswitch and mechanism.  Repair or replace  Check microswitch and mechanism.  Repair or replace  Repair or replace  Repair  Repair or replace  Repair  Repair or replace  Repair  Repair or replace  Repair  Repair or replace  Repair  Repair or replace  Solder 1, manufactor).  Repair or replace  Solder 12" long 22 awg.  insulated wire to pin  Nearby devices generating  high voltages and/or  high frequencies.  Repair or replace  Solder 12" long 22 awg.  insulated wire to pin  20 of J2 (P.C.B. 22 pin  connector). Leave one  end hanging loose, taking  care that wire is prop-  erly insulated. If game		Bad speaker	Replace
Start with coin  Bad coin mechanism  Check microswitch and mechanism.  Repair or replace  Replace (even if just bent). Once bent, switch is unreliable.  Adjust power supply.  Measure voltage with test leads on P.C.B. (near 6 pin connector).  Repair or replace  Some is erratic.  Seems to work OK sometimes, other times not.  Bad P.C.B.  Carpet  Carpet  Solder 12" long 22 awg.  insulated wire to pin connector). Leave one end hanging loose, taking care that wire is properly insulated. If game	Game does not		
All controls completely inoperative  Bad P.C.B.  Ground wire to control harness open (disconnected)  Bad P.C.B.  Bad P.C.B.  Some controls inoperative  Came is erratic.  Seems to work OK sometimes, other times not.  Bad P.C.B.  Bad leaf switches in control panel  Came is static sensitive  Came is static  Seems to work OK sometimes, other times not.  Bad P.C.B.  Carpet  Nearby devices generating high voltages and/or high frequencies.  Seems to work of the proper to the prope		•	
All controls completely inoperative  Bad P.C.B.  Ground wire to control harness open (disconnected)  Bad P.C.B.  Bad P.C.B.  Bad P.C.B.  Bad P.C.B.  Repair or replace  Sold public power supply.  Measure voltage with test leads on P.C.B. (near 6 pin connector).  Repair or replace  Solder 12" long 22 awg.  insulated wire to pin  Nearby devices generating  high voltages and/or  high frequencies.  Nearby devices generating  high voltages and/or  high frequencies.  Insulated wire to pin  connector). Leave one  end hanging loose, taking  care that wire is properly insulated. If game	State with com		mechanism.
Pletely inoperative    Common of the control harness open (disconnected)	•	Bad P.C.B.	
harness open (disconnected)  Bad P.C.B.  Bad P.C.B.  Bad leaf switches in Replace (even if just bent). Once bent, switch is unreliable.  Game is erratic.  Seems to work OK sometimes, other times not.  Bad P.C.B.  Carpet  Game is static sensitive  Came is static sensitive  Came is static high requencies.  Carpet  Nearby devices generating high requencies.  Carpet end hanging loose, taking care that wire is proper.			Repair
Some controls inoperative control panel Replace (even if just bent). Once bent, switch is unreliable.  Game is erratic. Adjust power supply.  Measure voltage with test leads on P.C.B. (near 6 pin connector).  Bad P.C.B. Repair or replace  Carpet Solder 12" long 22 awg.  Game is static sensitive Nearby devices generating high voltages and/or high frequencies.  Nearby devices generating care that wire is properly insulated. If game		harness open (disconnected)	
inoperative control panel bent). Once bent, switch is unreliable.  Game is erratic. Adjust power supply. Measure voltage with test leads on P.C.B. (near 6 pin connector).  Bad P.C.B. Repair or replace Carpet Solder 12" long 22 awg.  Game is static sensitive Nearby devices generating high voltages and/or high frequencies.  Nearby devices generating care that wire is properly insulated. If game		Bad P.C.B.	
Game is erratic. Seems to work OK sometimes, other times not.  Bad P.C.B.  Carpet  Game is static sensitive  Seems to work OK sometimes, other times not.  Bad P.C.B.  Carpet  Solder 12" long 22 awg. insulated wire to pin 20 of J2 (P.C.B. 22 pin high voltages and/or high frequencies.  high frequencies.  is unreliable.  Adjust power supply.  Measure voltage with test leads on P.C.B. (near 6 pin connector).  Repair or replace Solder 12" long 22 awg. insulated wire to pin connector). Leave one end hanging loose, taking care that wire is prop- erly insulated. If game	Some controls	Bad leaf switches in	
Game is erratic.  Seems to work OK sometimes, other times not.  Bad P.C.B.  Carpet  Game is static sensitive  Seems to work OK sometimes, other times not.  Bad P.C.B.  Carpet  Weather  Nearby devices generating high voltages and/or high frequencies.  Signature voltage with test leads on P.C.B. (near 6 pin connector).  Repair or replace  Solder 12" long 22 awg. insulated wire to pin 20 of J2 (P.C.B. 22 pin connector). Leave one end hanging loose, taking care that wire is properly insulated. If game		control panel	bent). Once bent, switch
Seems to work OK sometimes, other times not.  Bad P.C.B.  Carpet  Game is static sensitive  Nearby devices generating high voltages and/or high frequencies.  Low +5vdc power  Measure voltage with test leads on P.C.B. (near 6 pin connector).  Repair or replace  Solder 12" long 22 awg. insulated wire to pin 20 of J2 (P.C.B. 22 pin connector). Leave one end hanging loose, taking care that wire is properly insulated. If game	•		
sometimes, other times not.  Bad P.C.B.  Carpet  Solder 12" long 22 awg.  Weather  Sensitive  Nearby devices generating high voltages and/or high frequencies.  Nearby devices.  Solder 12" long 22 awg.  insulated wire to pin 20 of J2 (P.C.B. 22 pin connector). Leave one end hanging loose, taking care that wire is properly insulated. If game	Seems to work OK sometimes, other		Adjust power supply.
times not.  Bad P.C.B.  Carpet  Solder 12" long 22 awg.  insulated wire to pin  sensitive  Nearby devices generating high voltages and/or high frequencies.  Pin connector).  Repair or replace  Solder 12" long 22 awg.  insulated wire to pin  20 of J2 (P.C.B. 22 pin  connector). Leave one end hanging loose, taking care that wire is prop- erly insulated. If game		Low +5vdc power	
times not.  Bad P.C.B.  Carpet  Solder 12" long 22 awg.  insulated wire to pin  weather  Sensitive  Nearby devices generating high voltages and/or high frequencies.  Solder 12" long 22 awg.  insulated wire to pin  20 of J2 (P.C.B. 22 pin  connector). Leave one end hanging loose, taking care that wire is prop- erly insulated. If game			leads on P.C.B. (near 6
Game is static sensitive  Carpet Weather Nearby devices generating high voltages and/or high frequencies.  Solder 12" long 22 awg. insulated wire to pin 20 of J2 (P.C.B. 22 pin connector). Leave one end hanging loose, taking care that wire is prop- erly insulated. If game			
Game is static sensitive  Nearby devices generating high voltages and/or high frequencies.  Weather  100 of J2 (P.C.B. 22 pin connector). Leave one end hanging loose, taking care that wire is properly insulated. If game		Bad P.C.B.	
sensitive  Nearby devices generating high voltages and/or high frequencies.  Nearby devices generating connector). Leave one end hanging loose, taking care that wire is prop- erly insulated. If game		Carpet	
high voltages and/or connector). Leave one end hanging loose, taking care that wire is properly insulated. If game		Weather	
high frequencies.  end hanging loose, taking care that wire is properly insulated. If game		Nearby devices generating	
care that wire is property insulated. If game		high voltages and/or	connector). Leave one
erly insulated. If game		high frequencies.	
			shuts off too easily then,
trim the wire shorter as			trim the wire shorter as
necessary.			necessary.

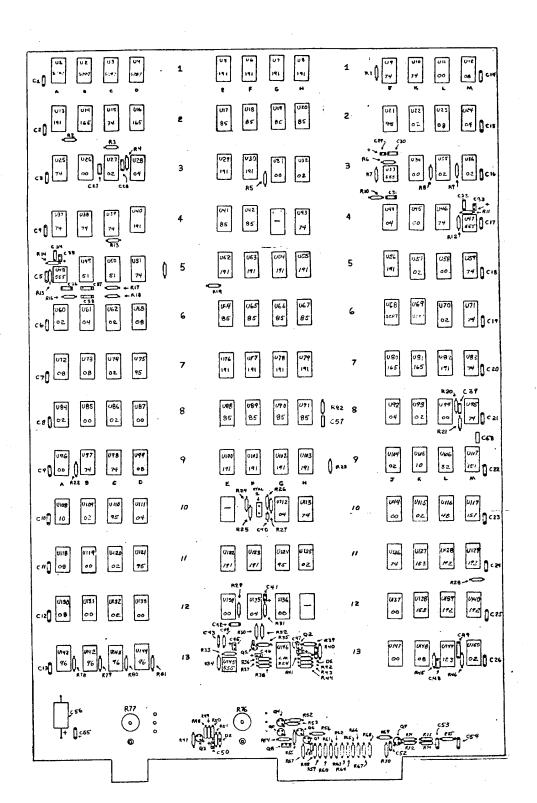
#### P.C. BOARD CONNECTOR PINOUT

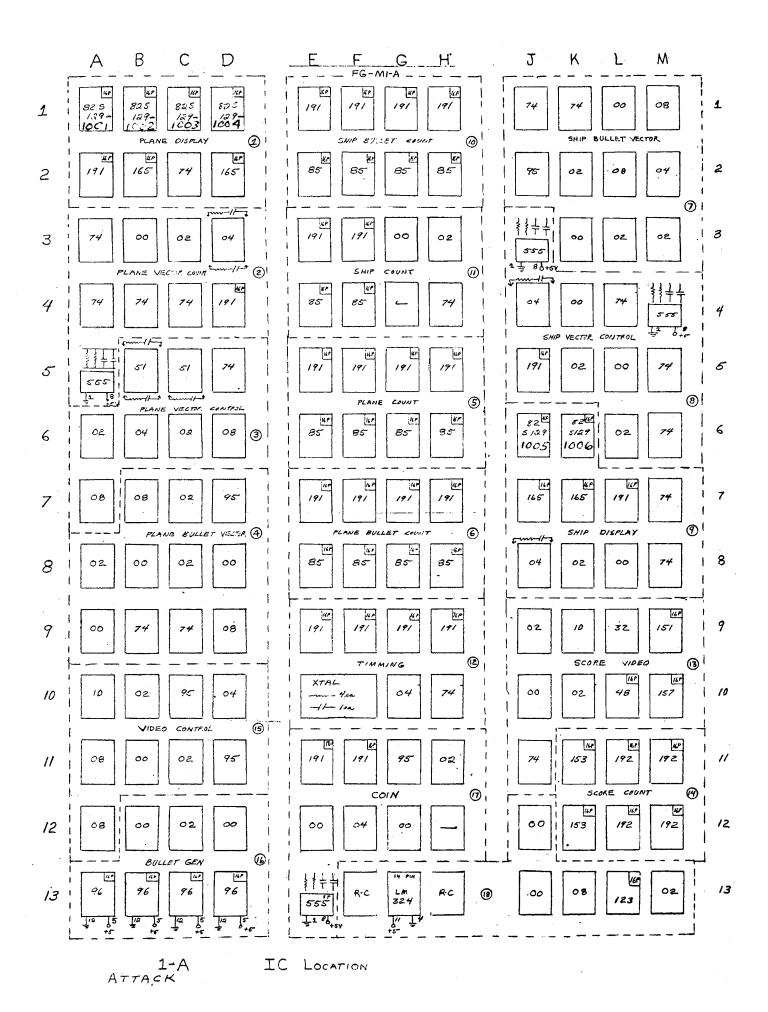
```
2. } GND
3. } +5V
4. } GND
6. } GND
```

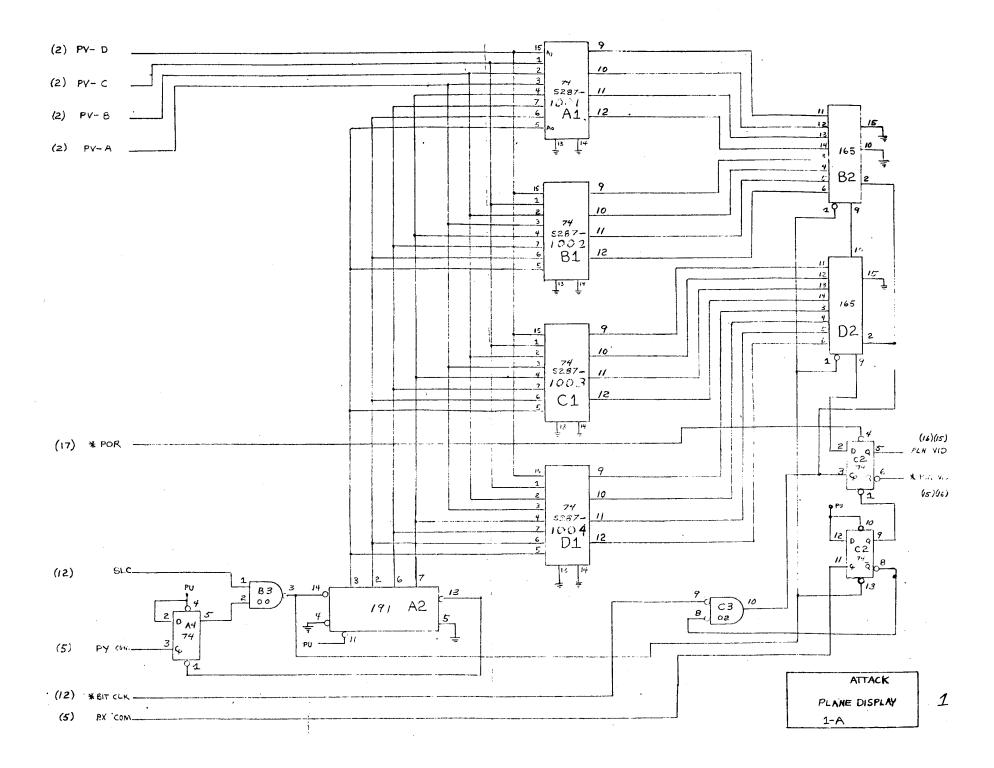
```
1. +12v (and one side of SPKR)
    SPKR (direct)
2.
3.
    GND
4.
5.
6.
    *SML....(ship move left)
7.
8.
    *SMR.....(ship move right)
    *SHP GR.....(ship gun right)
9.
10.
    *SHP GL....(ship gun left)
    *SBF NO.....(ship button fire)
11.
     SBF NC.....(ship button fire)
12.
         NO.....(plane button fire)
13.
    *PBF
    *PBF
         NC.....(plane button fire)
14.
    *PLN SPD FST...(plane speed fast)
15.
    *PLN RCCW.....(plane rotate counter-clockwise)
16.
17.
    *PLN RCW.....(plane rotate clockwise)
18.
     COIN.....(coin drop)
19.
20.
     ANT.....(anti-static antenna)
21.
     VIDEO RETURN
22.
     TV VIDEO
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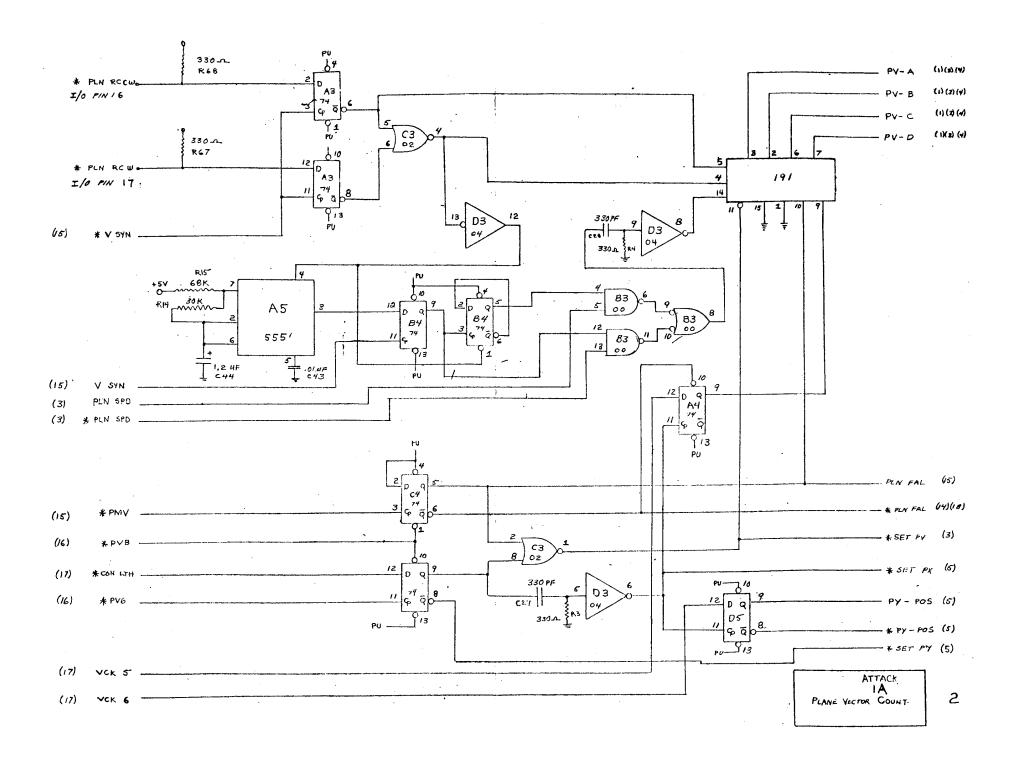
BY Exidy

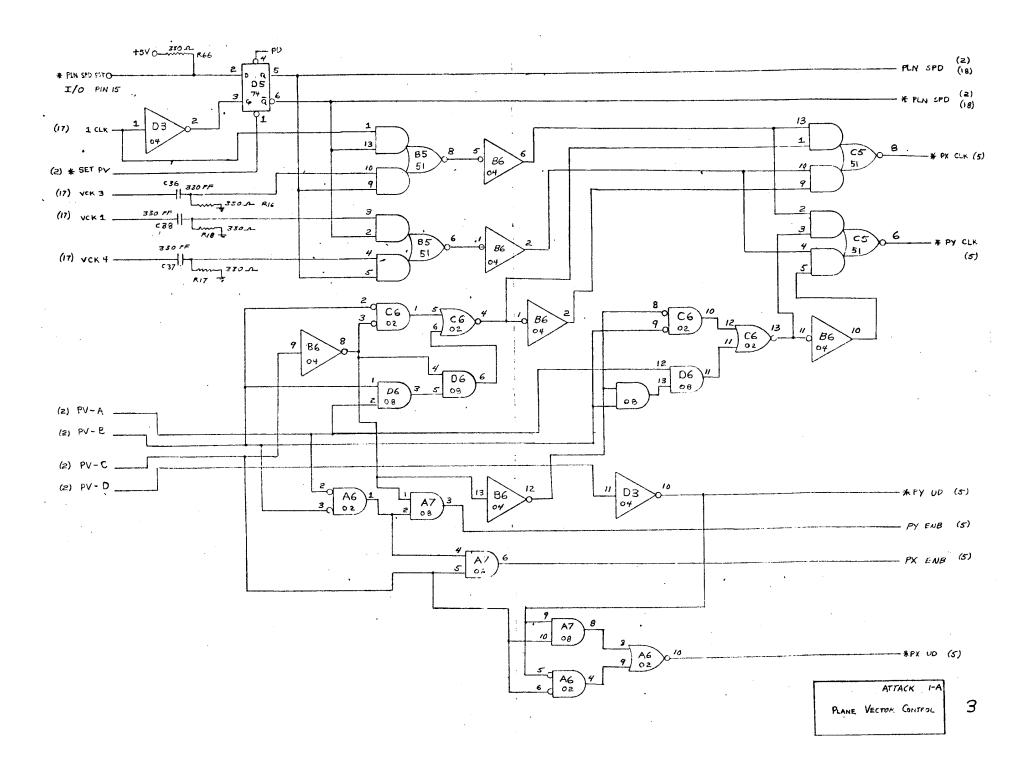
LOGIC DIAGRAM 1A

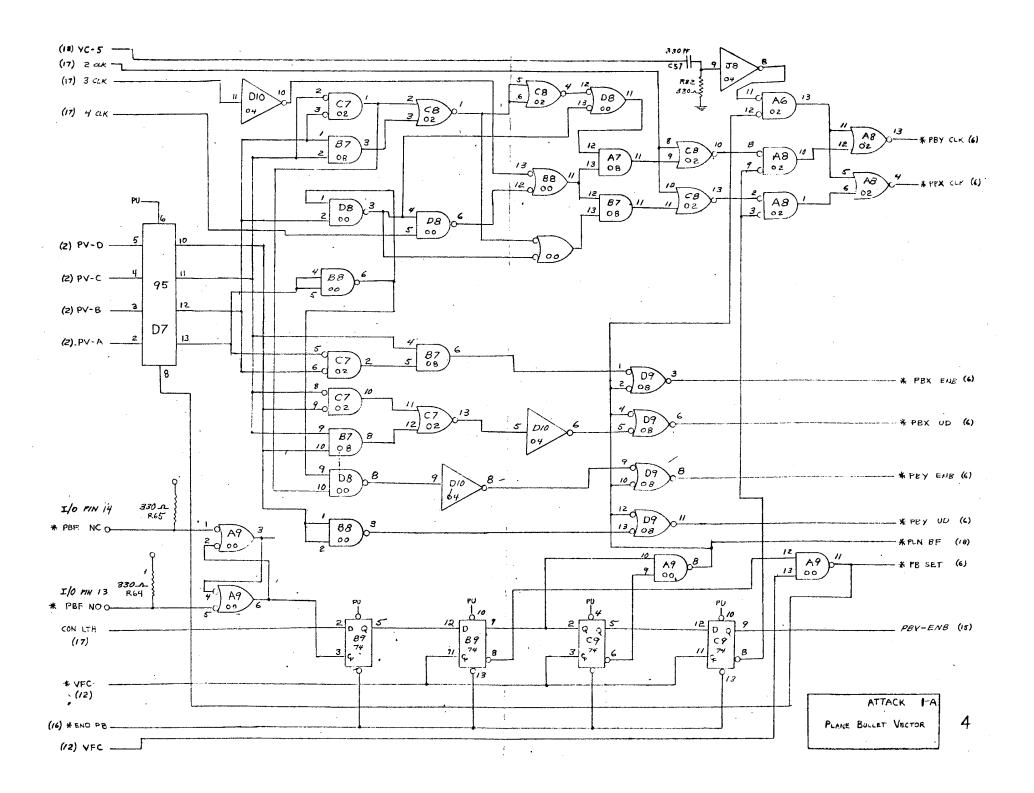


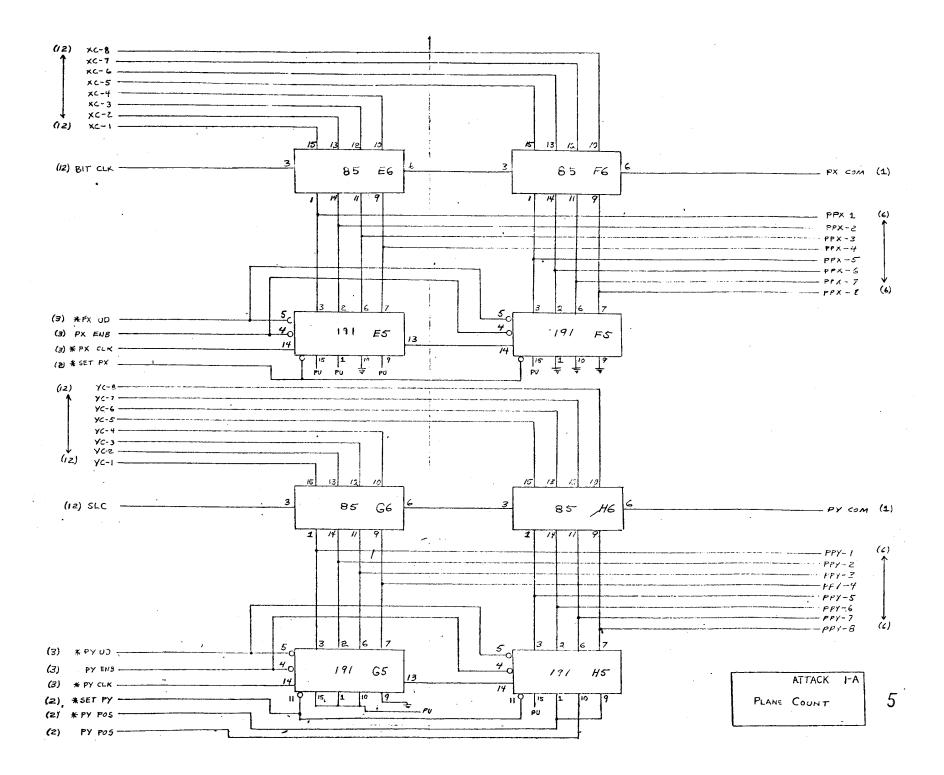


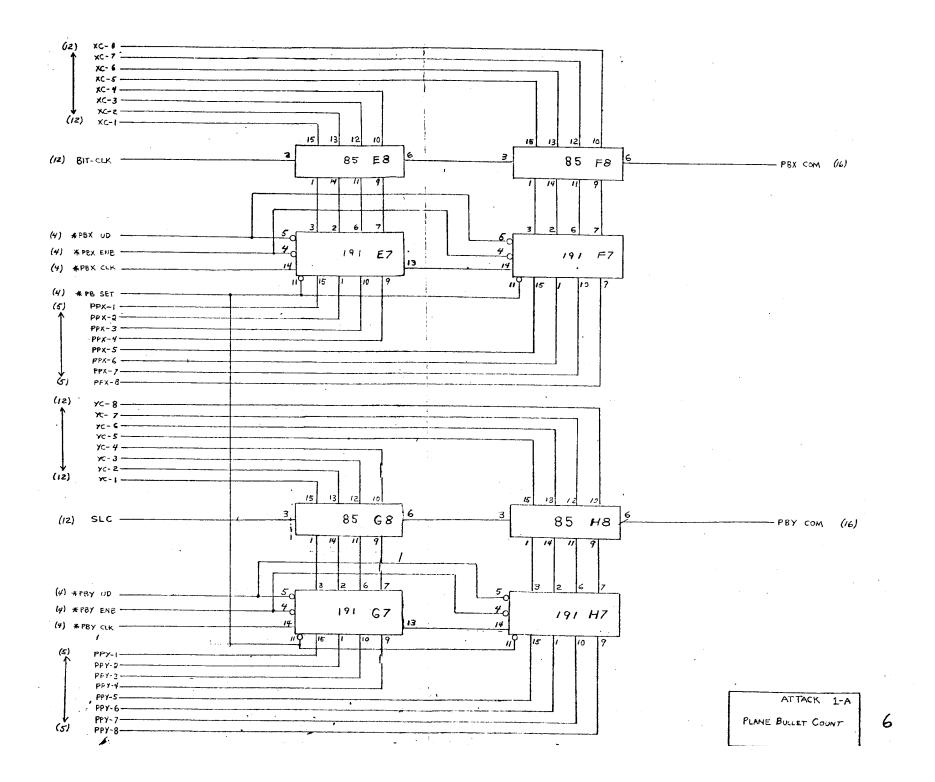


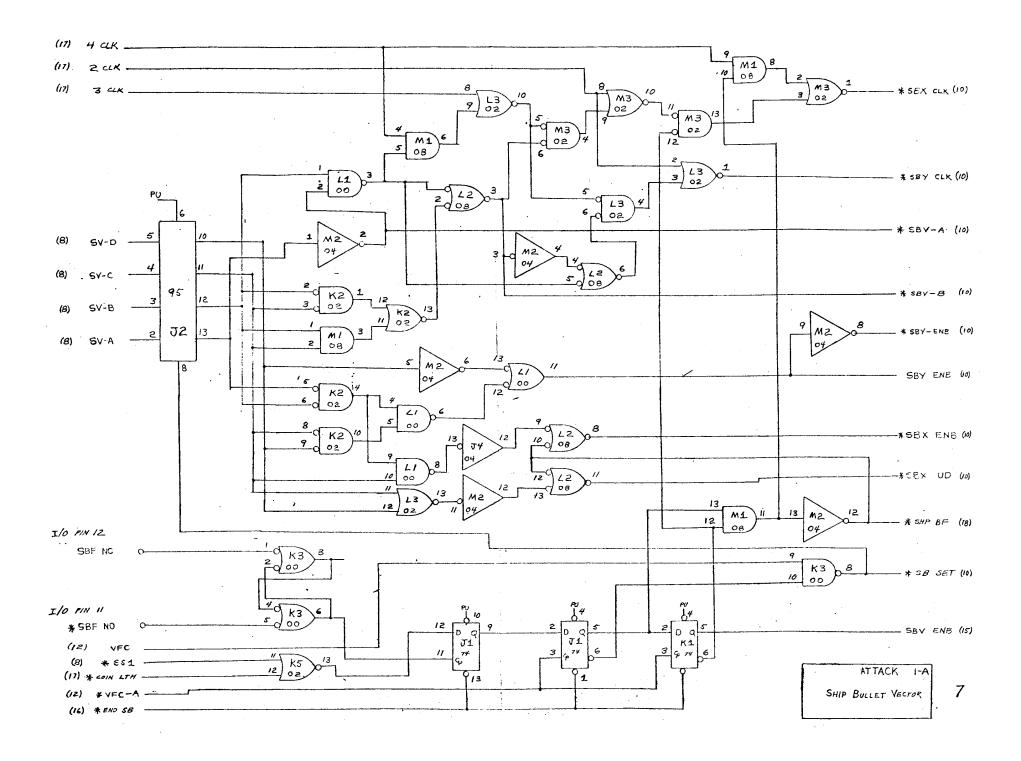


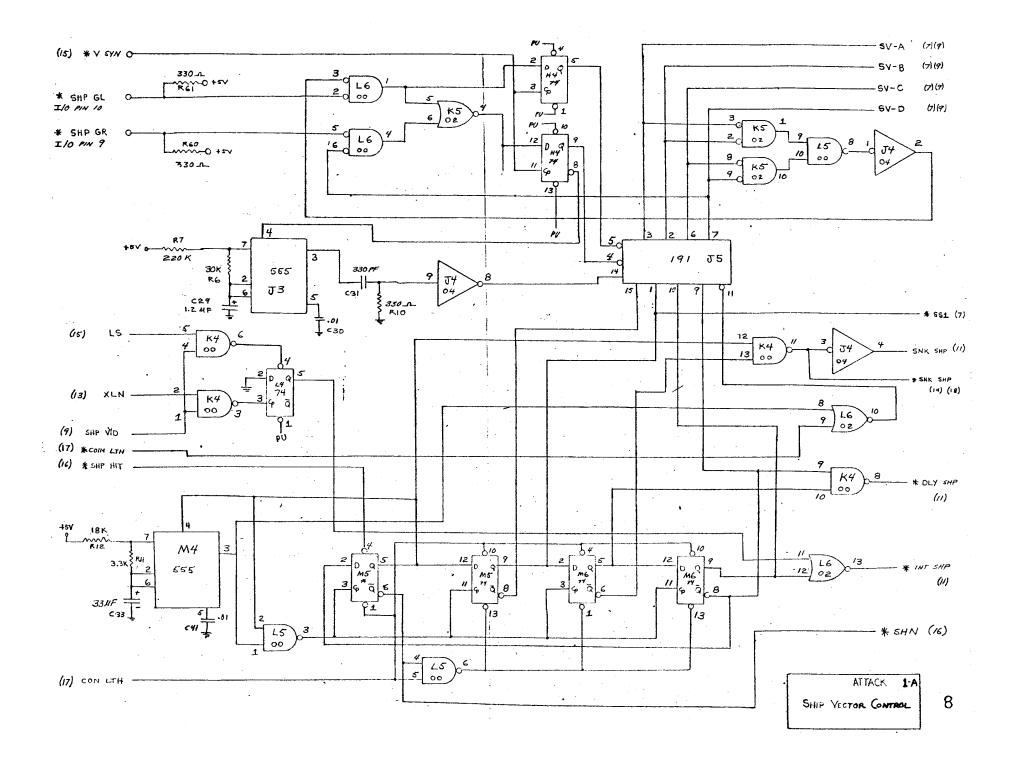


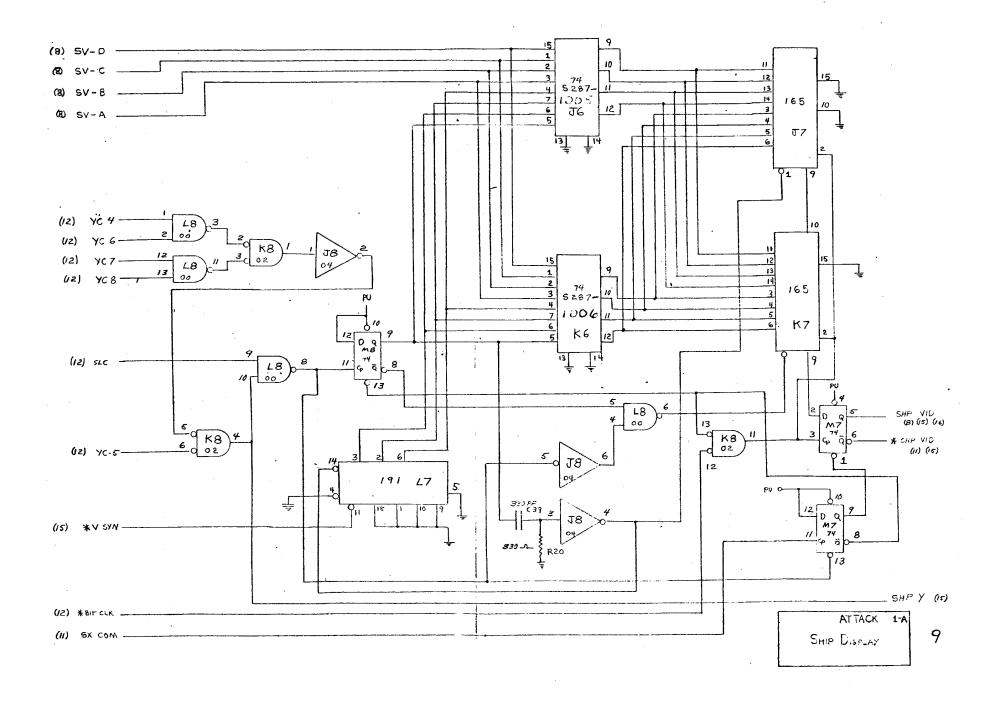


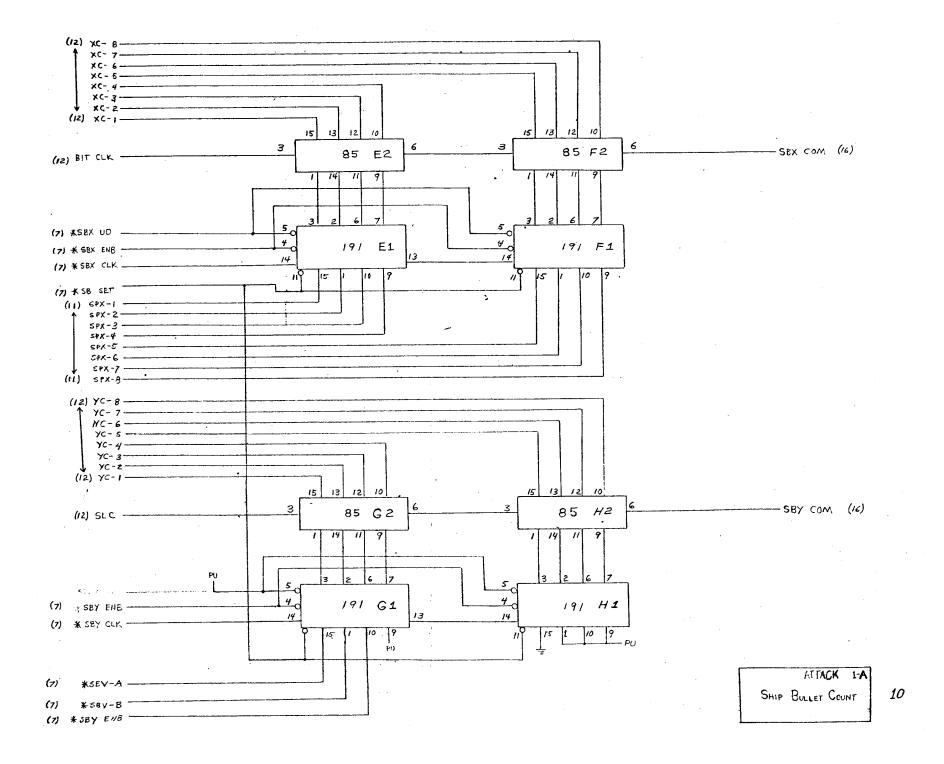


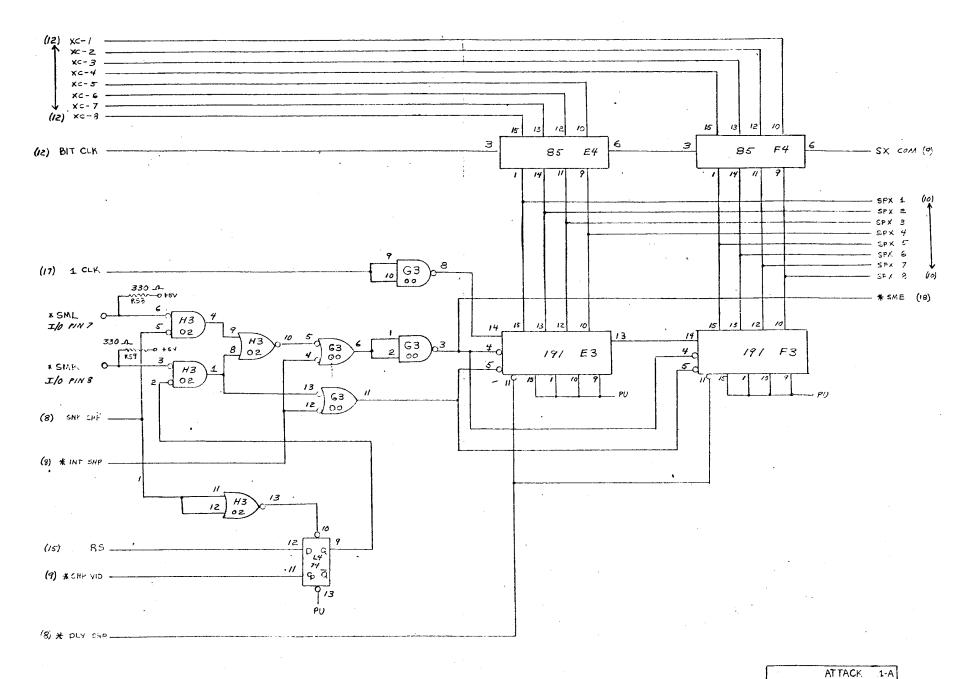






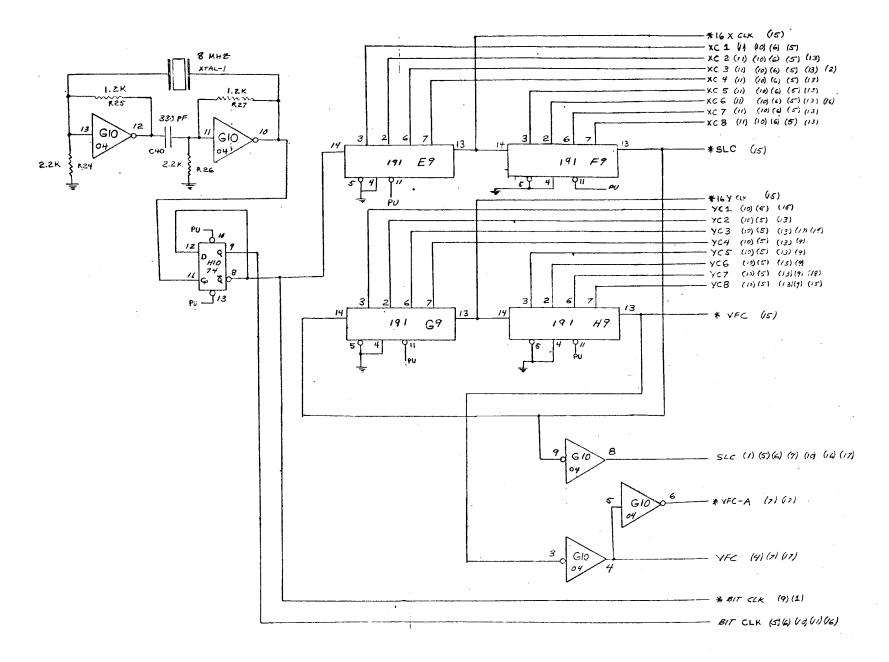






SHIP X COUNT

11



ATTACK 1-A

